

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 07-185271

(43)Date of publication of application : 25.07.1995

(51)Int.Cl.

B01D 65/02

(21)Application number : 05-345957

(71)Applicant : KURITA WATER IND LTD

(22)Date of filing : 24.12.1993

(72)Inventor : IMAI KAZUO

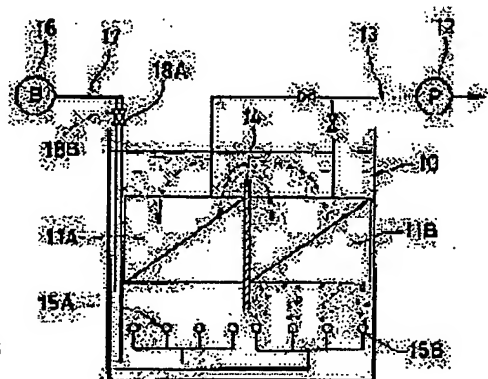
SAWADA SHIGEKI

(54) IMMERSION MEMBRANE APPARATUS

(57)Abstract:

PURPOSE: To effectively peel the non-filterable substance bonded to a membrane surface.

CONSTITUTION: In an immersion membrane apparatus wherein membrane units 11A, 11B are immersed in the liquid of a treatment tank 10 and the filtered treated water transmitted through the membranes of both units is obtained, the membrane units 11A, 11B are arranged in the liquid of the tank so as to be separated by a partition plate 14 and air diffusing devices 15A, 15B are individually installed under the individual membrane units and made alternately operable.



LEGAL STATUS

[Date of request for examination] 20.04.2000

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3341428

[Date of registration] 23.08.2002

[Number of appeal against examiner's
decision of rejection]

[Date of requesting appeal against examiner's
decision of rejection]

[Date of extinction of right]

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EUROPEAN PATENT OFFICE

Patent Abstracts of Japan

PUBLICATION NUMBER : 07185271
PUBLICATION DATE : 25-07-95

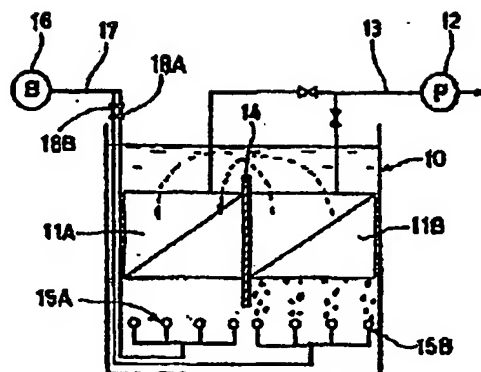
APPLICATION DATE : 24-12-93
APPLICATION NUMBER : 05345957

APPLICANT : KURITA WATER IND LTD;

INVENTOR : SAWADA SHIGEKI;

INT. CL. : B01D 65/02

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JP. 6185271 Machine Translation - FirstPass

(19) 【発行国】 日本国特許庁 (JP)

(12) 【公報種別】 公開特許公報 (A)

(11) 【公開番号】 特開平 7-185271

(43) 【公開日】 平成 7 年 (1995) 7 月 25 日

(54) 【発明の名称】 浸透膜装置

(51) 【国際特許分類第 6 版】

B01D 65/02 520 9441-4D

【審査請求】 未請求

【請求項の数】 1

【出願形態】 FD

【全頁数】 3

(21) 【出願番号】 特願平 5-345957

(22) 【出願日】 平成 5 年 (1993) 12 月 24 日

(71) 【出願人】

【識別番号】 000001063

【氏名又は名称】 栗田工業株式会社

【住所又は居所】 東京都新宿区西新宿 3 丁目 4 番 7 号

(72) 【発明者】

【氏名】 今井 和夫

【住所又は居所】 東京都新宿区西新宿 3 丁目 4 番 7 号 栗田工業株式会社内

(72) 【発明者】

【氏名】 沢田 繁樹

【住所又は居所】 東京都新宿区西新宿 3 丁目 4 番 7 号 栗田工業株式会社内

(74) 【代理人】

(19) [Publication Office] Japanese Patent Office (JP)

(12) [Kind of Document] Japan Unexamined Patent Publication (A)

(11) [Publication Number of Unexamined Application (A)] Japan Unexamined Patent Publication Hei 7-185271

(43) [Publication Date of Unexamined Application] 1995 (1995) July 25 day

(54) [Title of Invention] PERMEATION MEMBRANE MODULE

(51) [International Patent Classification 6th Edition]

B01D 65/02 520 944 1-4D

[Request for Examination] Examination not requested

[Number of Claims] 1

[Form of Application] FD

[Number of Pages in Document] 3

(21) [Application Number] Japan Patent Application Hei 5-345957

(22) [Application Date] 1993 (1993) December 24 day

(71) [Applicant]

[Applicant Code] 000001063

[Name] KURITA WATER INDUSTRIES LTD. (DB 69-055-5503)

[Address] Tokyo Shinjuku-ku Nishishinjuku 3-4-7

(72) [Inventor]

[Name] Imai Kazuo

[Address] Inside of Tokyo Shinjuku-ku Nishishinjuku 3-4-7 Kurita Water Industries Ltd. (DB 69-055-5503)

(72) [Inventor]

[Name] Sawada Shigeki

[Address] Inside of Tokyo Shinjuku-ku Nishishinjuku 3-4-7 Kurita Water Industries Ltd. (DB 69-055-5503)

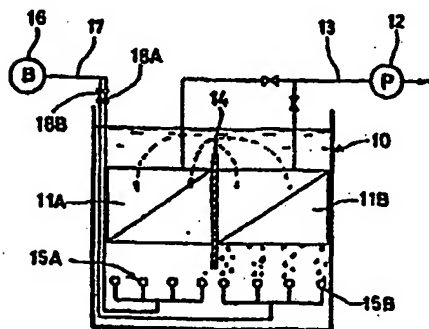
(74) [Attorney(s) Representing All Applicants]

【発明者】

(57) 【要約】

【目的】 膜面に付着した非透過物質を膜面から効果的に剥離する。

【構成】 処理槽 10 の液中に膜ユニット 11 を浸漬し、膜を透過した透過処理水を得る浸漬膜装置において、複数の膜ユニット 11A、11B を液中の仕切板 14 で隔て、槽内液中に配置すると共に、その個々の膜ユニットの下方に個々に散気装置 15A、15B を設け、散気装置を交互に作動可能にする。



【特許請求の範囲】

【請求項 1】 処理槽の液中に膜ユニットを浸漬し、膜を透過した透過処理水を得る浸漬膜装置において、複数の膜ユニットを液中の仕切板で隔て、槽内液中に配置すると共に、その個々の膜ユニットの下方に個々に散気装置を設け、散気装置を交互に作動可能にしたことを特徴とする浸漬膜装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 この発明は、平膜を複数枚積層した積層体や、中空糸膜を平面状、或いはすだれ状にした膜エレメントを複数枚積層した積層体や、管状膜を複数本並行に接続したものを膜ユニットとして用いた浸漬膜装置に関する。

【Patent Attorney】

(57) 【Abstract】

【Objective】 Rejected matter which deposits in film surface it peels off from film surface in the effective.

【Constitution】 As it soaks membrane unit 11 in liquid of treatment tank 10, separating membrane unit 11A, 11B of multiple with partition 14 in liquid in permeation membrane module which obtains the filtered water which transmitted membrane, it arranges in tank internal liquid, it provides air disperser 15A, 15B individually in downward direction of individual membrane unit, makes air disperser alternately operation possible.

【Claim(s)】

【Claim 1】 As it soaks membrane unit in liquid of treatment tank, separating membrane unit of multiple with partition in liquid in permeation membrane module which obtains the filtered water which transmitted membrane, it arranges in tank internal liquid, the permeation membrane module which designates that it provides air disperser individually in the downward direction of individual membrane unit, air disperser alternately operation it makes possible as feature.

【Description of the Invention】

【0001】

【Field of Industrial Application】 As for this invention, laminate which flat membrane multiple sheet is laminated and, laminate which membrane element which hollow fiber membrane is made flat surface or the other multiple sheet is laminated and, it regards permeation membrane module which uses those which tubular membrane multiple in parallel are connected as

[0002]

【従来の技術】処理槽の液中に上述した膜ユニットを浸漬し、膜ユニットの内部を吸引して膜を透過した濾過処理水を得る濾過装置は従来から公知である。又、膜の下側に散気装置を設け濾過ケーキを剥離させることも公知である。

[0003]

【発明が解決しようとする課題】この濾過装置を運転して膜濾過を行うと、膜面には濃度分極層、ゲル層、ケーキ層などの非透過物質が付着する。そして、非透過物質の厚さが増すと濾過抵抗が増大し、濾過圧力が高まって濾過効率は著しく低下する。このため膜ユニットの下方に散気装置を設け、一定時間膜濾過運転を行った後、又は膜濾過運転中に一定濾過圧力になったら、運転を中止して逆洗を行うが、この逆洗の前後に散気装置を作動し、膜ユニットの下全体に下から気泡を吹き、膜の両面を上向する気泡と、上向水流の両方から膜面に付着した非透過物質を剥離する必要がある。この場合、膜ユニットの回りに槽内の液が下向流して循環する対流スペースを確保することが必要で、処理槽内への膜の充填率がその対流スペース分だけ減少することになる。

[0004]

【課題を解決するための手段】そこで本発明は、処理槽の液中に膜ユニットを浸漬し、膜を透過した濾過処理水を得る濾過装置において、複数の膜ユニットを液中の仕切板で隔て、槽内液中に配置すると共に、その各々の膜ユニットの下方に個々に散気装置を設け、散気装置を交互に作動可能にしたことを特徴とする。

[0005]

【実施例】図示の各実施例において、10は処理槽で、処理槽の液中には膜ユニット11が浸漬してあり、ポンプ12を接続した吸引管13が膜ユニットの内部を吸引し、処理槽内の溶液中、膜ユニット11を透過したものを濾過処理水として排水する。膜ユニットは、前述したように平度の複数枚の

membrane unit.

[0002]

[Prior Art] Membrane unit which description above is done was soaked in liquid of treatment tank, inside of membrane unit was absorbed and permeation membrane module which obtains filtered water which membrane was transmitted is public knowledge from until recently. air disperser is provided in bottom of also, membrane and also fact that the filter cake is exfoliated is public knowledge.

[0003]

[Problems to be Solved by the Invention] Driving this permeation membrane module, when it does membrane filtration, concentration polarized layer, gel layer and the cake layer or other rejected matter deposit in film surface. When and, thickness of rejected matter increases, filtration resistance increases, the filtration pressure increases and filtration efficiency decreases considerably. Because of this in downward direction of membrane unit air disperser to provide, When constant time membrane filtration operation is done, or in membrane filtration operation becomes fixed filtration pressure, discontinuing driving, it does reverse washing, but air disperser it operates on front and back of this reverse washing, in bottom surface entirety of membrane unit pours the gas bubble from under, rejected matter which with shear stress of gas bubble and the upper direction water stream which between membrane upper direction are done deposits in film surface it is necessary to peel off. In this case, liquid of inside tank downwardly directed stream doing the around membrane unit, being necessary to maintain countercurrent space which circulates fill factor of membrane to inside treatment tank just countercurrent space portion means to decrease.

[0004]

[Means to Solve the Problems] Then as this invention soaks membrane unit in liquid of treatment tank, separating membrane unit of multiple with partition in liquid in the permeation membrane module which obtains filtered water which transmitted membrane, arranges in the tank internal liquid, it provides air disperser individually in downward direction of the individual membrane unit, air disperser alternately it designates that it makes operation possible as feature.

[0005]

[Working Example(s)] In each Working Example in illustration, 10 with treatment tank, membrane unit 11 is soaked in liquid of treatment tank, suction pipe 13 which connects pump 12 absorbs inside of membrane unit, water sample does in starting liquid inside the treatment tank, with those which

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膜層体、又は中空糸膜を平面状、或いはすだれ状にした膜エレメントの複数枚の膜層体、又は管状膜を複数本並行に接続したものである。

[0006] 図1の実施例では、処理槽10内に2つの膜ユニット11A、11Bを上端が液面下の仕切板14で隔てられ隣接状に配置してあり、各膜ユニット11A、11Bの下方には個々に空気装置15A、15Bが設けてある。4つの空気装置15A、15Bは共通のブロー16に分岐管17で接続し、管に設けた開閉弁18A、18Bで個々に作動できるようにになっている。膜透過運転を中止し、逆洗を行う前後に開閉弁18A、18Bを交互に開閉し、例えば空気装置15Aから15分間、気泡を膜ユニット11Aに送り、次の15分は空気装置15Bから気泡を膜ユニット11Bに送り、これを繰り返す。これにより空気装置15Aから浮上する気泡によって膜ユニット11Aの膜の両面には上向流が生じ、気泡と上向水流により膜ユニット11Aの膜面に付着した非透過物質は膜面から剥離し、同時に膜ユニット11Bの膜面には下向流が生じ、この下向水流によって膜面に付着した非透過物質が剥離される。空気装置15Bが作動しているときは上記とは逆に膜ユニット11Bの膜面に付着した非透過物質は気泡と上向水流により膜面から剥離し、膜ユニット11Aの膜面に付着した非透過物質は膜面に生じた下向水流で膜面から剥離する。尚、空気装置の運転を中止して行っても、膜の運転中に行ってもよい。

[0007] 図2の実施例では、処理槽10内に4つの膜ユニット11A、11B、11C、11Dを三枚の仕切板14A、14B、14Cで隔てられ隣接状に配置してあり、各膜ユニットの下方には個々に空気装置15A、15B、15C、15Dが設けてある。4つの空気装置は共通のブロー16に分岐管17で接続し、分岐管に設けた4つの開閉弁18A、18B、18C、18Dで4つの空気装置を個々に作動することができる。膜透過運転を行っている間、或いは運転を中止し、逆洗の前後に開閉弁を操作し、例えば空気装置15A、15B、15C、15Dの順に15分間作動させたり、或いは15Aと15C、15Bと15Dを15分間交互に作動させる。作動している空気装置の上の膜ユニットの膜面には気泡による上向流が生じ、気泡と上向水流が膜面に付

transmitted membrane unit 11 as filtered water. As for membrane unit, way you mention earlier, laminate of multiple sheet of the flat membrane. Or laminate of multiple sheet of membrane element which hollow fiber membrane is made the flat surface or ratten. Or it is something which tubular membrane multiple in parallel is connected.

[0006] With Working Example of Figure 1, inside treatment tank 10 upper edge separating the 2 membrane unit 11A, 11B with partition 14 under liquid surface, it is arranged in adjacent, their disperser 15A, 15B is provided individually in downward direction of each membrane unit 11A, 11B. You connect air disperser 15A, 15B of 4 to common blower 16 with manifold 17, you are designed in such a way that it can be operated individually with opening and closing valve 18A, 18B which is provided in tube. membrane filtration operation is discontinued, opening and closing valve 18A, 18B is opened and closed alternately on front and back which does reverse washing, 15 min and gas bubbles are poured to membrane unit 11A from for example air disperser 15A, following 15 min pour the gas bubble to membrane unit 11B from air disperser 15B, repeats this. Because of this upwards flow occurs between membrane of membrane unit 11A due to the gas bubble which floating is done from air disperser 15A, rejected matter which deposits in film surface of membrane unit 11A with gas bubble and upper direction water stream peels off from film surface, downwardly directed stream occurs simultaneously between membrane of membrane unit 11B, rejected matter which deposits in film surface with this downward water stream is exfoliated. When air disperser 15B operates, being opposite to description above, the rejected matter which deposits in film surface of membrane unit 11B peels off from the film surface with gas bubble and upper direction water stream, rejected matter which deposits in film surface of membrane unit 11A peels off from film surface with the downward water stream which it occurs between membrane. Furthermore diffused air discontinuing driving membrane, also doing it may do on stream of membrane.

[0007] With Working Example of Figure 2, inside treatment tank 10 it separates membrane unit 11A, 11B, 11C, 11D of 4 with three partition 14A, 14B, 14C and is arranged in adjacent, air disperser 15A, 15B, 15C, 15D is provided individually in downward direction of each membrane unit. You can connect air disperser of 4 to common blower 16 with the manifold 17, air disperser of 4 you can operate individually with the opening and closing valve 18A, 18B, 18C, 18D of 4 which is provided in manifold. While doing membrane filtration operation, or it discontinues driving, operates opening and closing valve on front and back of reverse washing, 15 min address operates in order of the for example air disperser 15A, 15B, 15C, 15D, or 15A and 15C, 15B and 15D operates in 15 min arm alternation.

着した汚濁物質を剥離し、作動していない散気装置の上の膜ユニットの膜面には下向流が生じ、この下向水質が膜面に付着した汚濁物質を膜面から剥離する。

[0008]

【発明の効果】以上で明らかなように、散気装置を交互に作動することで、作動している散気装置の上の膜ユニットの膜面には気泡による上向流が生じ、気泡と上向水質とにより膜面に付着した汚濁物質を剥離する。そして、作動を中止している散気装置の上の膜ユニットの膜面には下向流が生じ、この下向水質が膜面に付着した汚濁物質を剥離する。従って、下向流を生じさせる対策スペースを膜ユニットの間に保つ必要がなくなるので、処理槽への膜充填率が高まる。又、同じ数の膜ユニットを充填する場合、使用する処理槽の大きさは大幅に小型化する。

【図面の簡単な説明】

【図1】本発明の浸漬膜装置の第1実施例の断面図である。

【図2】本発明の浸漬膜装置の他の1実施例の断面図である。

【符号の説明】

10 処理槽

11A 膜ユニット

11B 膜ユニット

11C 膜ユニット

11D 膜ユニット

12 ポンプ

13 吸引管

14 仕切板

14A 仕切板

Between membrane of membrane unit on air disperser which operates upwards flow due to gas bubble occurs, rejected matter where gas bubble and upper direction water stream deposit in film surface peels off, downwardly directed stream occurs between membrane of membrane unit on air disperser which does not operate there rejected matter where this downward water stream deposits in film surface peels off from the film surface.

[0008]

[Effects of the Invention] Way it is clear at above, air disperser by fact that it operates alternately, between membrane of membrane unit on air disperser which operates upwards flow due to gas bubble causes, rejected matter which deposits in film surface with with gas bubble and upper direction water stream peels off. And, downwardly directed stream occurs between membrane of membrane unit on air disperser which discontinues operation rejected matter where this downward water stream deposits in film surface peels off. Therefore, because necessity to maintain countercurrent space which causes the downwardly directed stream between membrane unit is gone, membrane fill factor to treatment tank increases, greatly miniaturization it does size of treatment tank which when it is filled, uses the membrane unit of also, same number.

【Brief Explanation of the Drawing(s)】

[Figure 1] It is a cross section of 1st Working Example of permeation membrane module of this invention.

[Figure 2] It is a cross section of other 1 Working Example of permeation membrane module of this invention.

【Explanation of Reference Signs in Drawings】

10 treatment tank

11A membrane unit

11B membrane unit

11C membrane unit

11D membrane unit

12 pump

13 suction pipe

14 partition

14A partition

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14B 仕切板

14C 仕切板

15A 散気装置

15B 散気装置

15C 散気装置

15D 散気装置

16 ブローア

17 分岐管

18A 開閉弁

18B 開閉弁

18C 開閉弁

18D 開閉弁

14B partition

14C partition

15A air disperser

15B air disperser

15C air disperser

15D air disperser

16 blower

17 manifold

18A opening and closing valve

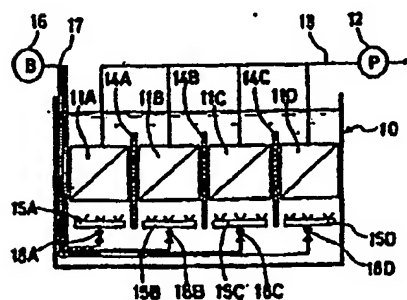
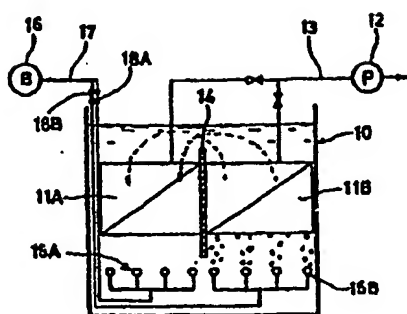
18B opening and closing valve

18C opening and closing valve

18D opening and closing valve

D4

【図1】



[Figure 1]

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(图2)

[Figure 2]

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